EE415 Writing Assignment 3: Concept Generation

Overview

Concept Generation plays a critical role in the "Engineering Design Synthesis" stage shown in our course graphical design algorithm and is competency #3 in our design rubric. From our textbook: "A product concept is an approximate description of the technology, working principles, and form of the product. …The degree to which a product satisfies clients and can be successfully commercialized depends to a large measure on the quality of the underlying concept. …Thorough exploration of alternatives early in the development process greatly reduces the likelihood that the team will stumble upon a superior concept late in the development process or that a competitor will introduce a product with dramatically better performance than the product under development" (pp.98-99). You can find more about the expectations for concept generation by referring to the course's engineering design rubric. See page 2 of this assignment for brainstorming as a strategy for generating concepts.

Task

Describe how your Client Preferences and Target Technical Specifications were used to develop a set of product concepts from which you will (in EE415 writing assignment #4) select one concept for your work in EE416. Convince your audiences that the "full space of alternatives" has been considered.

Objectives

Use the textbook's Five-Step Method for Concept Generation (pp. 99-120) to:

A. **Clarify the Problem** (already completed in writing assignment #1, although you may have room for improvement)
B. **Search Resources** that are External to the Team (include: patent & literature searches; interviews with lead users or experts)
C. **Explore Systematically.** Depart from the one-system view of the design and decompose it into a set of sub functions, into a set of subsystems, into a sequence of actions and/or into the set of primary client needs.
D. **Search Internally** (within the team). Brainstorming fits here.
E. **Reflect on the Results and the Process**
F. **Continue to interact** with professionals volunteering to help your team.
G. **Communicate effectively** with the evaluation panel, your team, and later in the semester your client and/or mentor.

Audiences

Direct audience: EE415 evaluation panel and your team.
Indirect audiences (i.e., in the future you will need to communicate aspects of your concept generation process, not necessarily via this assignment): your client and/or mentor, as well as future potential employers.
[note: students will appear more technically mature to job interviewers if they can discuss a variety of ways that their target technical specifications could have been met].

Specifications
Due date: March 29 by 1 pm. Length: 800-1600 words; additional graphs, charts, sketches, etc. as needed.
Document Type: Your Choice [there are a wealth of collaborative writing tools freely available on the web; you can also choose to use traditional tools, such as a PDF or Word Doc. Use whatever works best for your team to fulfill the assignment's objectives].
Grading Details: 10% of Course Grade. The Engineering Design Rubric Competencies 3 & 7 will be used to give the team feedback and for grading.
Submit Your Work: via email.

Brainstorming as a strategy to successfully generate concepts
In brainstorming, all design ideas for your project are considered and none are rejected. Don't assume that your mentor has made all decisions for the team. In each project there are lots of details not yet specified and perhaps some prospective approaches to your design that your sponsoring company has not considered. Your brainstorming exercise is to consider a subset of the infinitely many ways your design can meet the Target Technical Specifications. Brainstorming allows the team to consider innovative ideas not yet considered by the sponsoring company. Even if your mentor knows that certain concepts won't be used, it's important for the team to generate alternative concepts. The entire team meets with the mentor (and co-mentors if appropriate) and faculty and graduate student resource people as many times as is required to complete the work on Concept Generation. The bulk of the creative ideas generated during the brainstorming activity will come from external literature and team members, not from the professionals helping the team. An effective team will generate ideas not yet considered by professionals helping the team.